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ABSTRACT: Firms cannot be competitive if their information system and business strategies are not aligned. The Strategic Alignment Model (SAM) developed by Henderson and Venkatraman (1993) considers strategic alignment as a standalone challenge between a single company and its information system. This concern of alignment has not been empirically extended to the inter-organizational level. This research raises the question of inter-organizational alignment and follows how companies, embedded in a supply chain, adapt their information systems and organizations while implementing IT driven innovation.
We conduct a single case study on a RFID project in a jewellery supply chain. This supply chain is made of a middle-sized retailer (MSR), composed of headquarters and 80 Stores, and one single supplier, a logistic services provider (LSP). By combining a RFID project framework and the Strategic Alignment model, this paper provides some answers to the dynamics of alignment and highlights various sequences according to the different phases of the project. Through a single case study, this paper finally proposes to extend the alignment perspectives of the SAM Model to the inter organizational level.

Keywords: Strategic Alignment Model, Inter-Organizational Alignments, RFID, Alignment Perspective, Supply Chain Management

1. Introduction

Today, globalization and technological innovations call for improved organizational adaptability and more flexible and advanced systems relative to manufacturing, logistics, engineering, information and process technology (Momme, 2002).

While focusing on their core competencies, companies have developed interaction with a network of partners that are incorporated in the decision making process, leading to increased dependency between business organizations and greater supply chain complexity. Information Technology and Information Systems (IS/IT) supporting the organization and its upstream and downstream partners, have been recognized as critical factors in Supply Chain improvement (Koh and Saad, 2006, Neubert *et al*., 2004). As pointed out by Gunasekaran and Ngai (2004), today it is impossible to have an effective supply chain without IT/IS which is like a nervous system for Supply Chain Management (Gunasekaran and Ngai, 2004).

The growing rate of goods exchange, especially in logistics-intensive industries that require reactivity and flexibility, has led to increasingly sophisticated needs in supply chain channels. Today, most improvements in companies' processes and interactions are supported by IT driven services innovation. Recently, Radio Frequency Identification (RFID), a wireless automatic identification and data capture technique, has been emerging as a new wave of inter-organizational systems. This technique is expected to radically transform interdependent supply chain business processes and Supply Chain practices (Srivastava, 2004, Tajima, 2007, Fosso-Wamba and Chatfield, 2009). Besides the technological issues related to what is considered as a disruptive innovation (Lefebvre *et al.*, 2006, Vail and Agarwal 2007), the literature shows the importance of organizational transformation to gain full benefit from this new IT (Asif and Mandviwalla, 2005, Cannon *et al.*, 2008, Delen *et al.*, 2007). The fit between IT and business, i.e. the alignment between IS/IT and strategies, is considered as one key for firm competitiveness and performance (Avison *et al.*, 2004). Most of the research has considered strategic alignment as a standalone problem, i.e. between one company's strategy and its own information system, often based on the Strategic Alignment Model (SAM) developed by Henderson and Venkatraman (1993). So far, this question has not been empirically extended to the inter-organizational level. This gap leads us to ask how do companies, embedded in a supply chain, adapt their information systems and organizations to reach their strategic goals with their suppliers and customers.

This paper addresses the issue of inter-organizational alignment in the context of RFID implementation in a jewellery supply chain consisting of a middle-sized retailer (MSR) and its logistic services provider (LSP). Based on a longitudinal description of the project from 2006 until the present, we highlight the main actors

and their expectations, the business processes and their transformations during the project, the information flows and the IT infrastructure that support RFID.

The paper is organized as follows. First, we review past research on SAM in Supply Chain (SC). Then, we describe the research methodology and the case study we carried out. Finally, we discuss our results and the implications of our work for further research on inter-organizational strategic alignment.

2. Strategic alignment in Supply Chains

For many years, researchers have drawn attention to the importance of alignment between business and IT. Several studies have been conducted on this issue according to the activity sector (Baets, 1996 conducted a survey in the banking industry, Bush *et al*., 2009, in the health care sector), to the country (Teo and Ang, 1999, studied IT/business alignment in Singaporean companies) or to the company size (Hussain *et al*., 2002, focused their research on SMEs). In 1993, Henderson and Venkatraman, influenced by research from MIT, proposed one of the most widely cited of all alignment models: the Strategic Alignment Model (SAM) (Chan and Reich, 2007). As this model is relevant both in academic and professional literature (Avison *et al*., 2004) we use it as a framework to support analysis of inter-organisational alignment in our RFID case study. In this section, the question of alignment practices in the context of supply chain will be discussed.

2.1. Strategic Alignment Model Background

Henderson and Venkatraman (1993) built the SAM on two propositions: first, the economic performance of a company depends on the strategic fit between strategy and the organizational and technological infrastructures that are deployed; second, strategic alignment relies on a dynamic process of adjustment between strategy and functional integration (organization and IT infrastructure). The SAM aims at understanding the dynamic fit between four related key domains (see Figure 1): business strategy, IT strategy, organization and IT infrastructure. As the business environment is constantly changing and IT innovations are abundant,

strategic alignment should not be seen as a state of being, but as a process of change and continuous adaptation over time to optimize performance.

In the model, a distinction is also drawn between the external perspective (strategy) and the internal focus (infrastructure and processes).

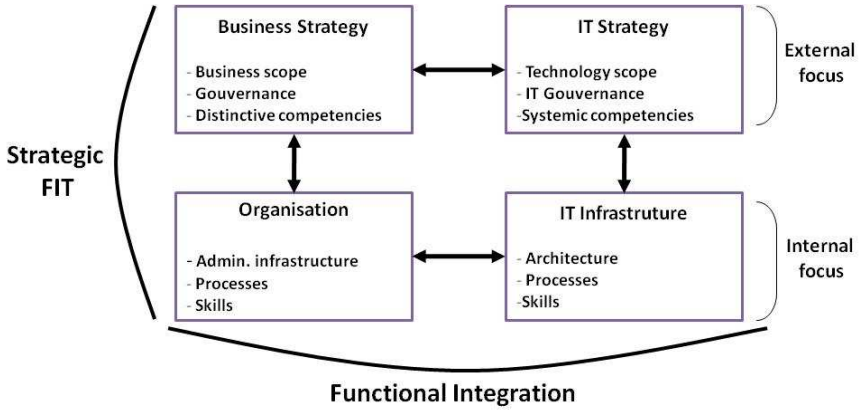


Figure 1: Strategic Alignment Model

Henderson and Venkatraman (1993) defined interaction perspectives between IT and business activities. Each perspective is made up of three domains: the anchor, the pivot, and the impacted domain. The anchor is considered the domain that is the strongest area of the business. The change that the business is to undergo is directed based on this perspective. The pivot designates the domain of the enterprise that will serve as the support for change through re-alignment. The domain of impact is the area that will be directly affected through the changes made in the pivot domain through the re-alignment (Henderson and Venkatraman, 1990; Luftman *et al.*, 1993; Papp, 1995, 2004).

There are a total of eight individual alignment perspectives (see Table 1) resulting from the analysis of strategic fit and functional integration simultaneously.

Strategy Execution: this perspective considers the business strategy as the driver of both organization design choices and the logic of the IT infrastructure. The anchor domain is business strategy. The pivot domain is the business infrastructure that needs to be changed. The resulting domain of impact is the information technology infrastructure.	

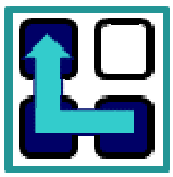
Technology Potential: this perspective is also driven by business strategy but the pivot is information technology strategy. The information technology infrastructure is thus the domain of impact.	
Competitive Potential: the anchor is information technology strategy and the pivot is business strategy, while organization infrastructure is the impacted domain. This perspective focuses on how emerging information technologies can influence and enable new business strategies.	
Service Level: in this perspective the anchor is information technology strategy, the pivot information technology infrastructure, and the area of impact is organizational infrastructure. The focus of this perspective is the manner in which information technology can improve how products and services are delivered.	
Organization IT Infrastructure: this perspective results in process improvements from information technology and the application of value to the business processes The anchor is organization infrastructure, the pivot is information technology infrastructure, and the impacted domain is information technology strategy.	
IT Infrastructure Strategy: the focus of this perspective is the improvement of information technology strategy based on the implementation of emerging and existing information technology infrastructures. The anchor is information technology infrastructure, which drives the pivot, information technology strategy, and thus impacting business strategy	
IT Organization Infrastructure: the anchor of the seventh perspective is also IT infrastructure, with the pivot being organizational infrastructure and the impact area being business strategy. Although similar to IT infrastructure strategy, IT in this perspective is the driving force and architect by which the visions and processes are carried out	
Organization infrastructure strategy: this final individual perspective exploits the capabilities to enhance new products and services, influence strategy, and develop new relationships. Business infrastructure is the anchor, and this perspective enables enhancement to business strategy (the pivot) thus changing the IT strategy (affected area).,	

Table 1: Alignment perspectives (from Papp, 1995)

Papp (1995) also identified four fusion perspectives which combine two of the individual perspectives (Table 2).

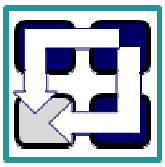
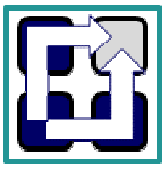
Organization Strategy Fusion Combination of IT Infrastructure Strategy Perspective and IT Organizational Infrastructure Perspective	
Organization Infrastructure Fusion Combination of Competitive Potential Perspective and Service Level Perspective	
IT Strategy Fusion Combination of Organizational Infrastructure Strategy Perspective and Organizational IT Infrastructure Perspective	
IT Infrastructure Fusion Combination of Strategy Execution Perspective and Technology Potential Perspective	

Table 2: Fusion perspectives (from Papp, 1995)

Even if the SAM appears to be the reference in strategic alignment, it has been broadly criticized. Ciborra (1997) argues that alignment is not the right way to consider organizations that are mainly driven by improvisation and tinkering with the resources at hand. Smaczny (2001) asserted that alignment, as a geometrical and mechanical approach, is not the appropriate paradigm for managing IT in today's organisations. Finally, Palmer and Markus (2000), using a basic alignment model and strategy descriptors, have shown that there is no association between fit and performance.

On the contrary, other authors have defended the SAM. Lederer and Mendelow (1989) have suggested that alignment increases the likelihood of developing systems more critical to the organisation and of obtaining top management support for IS. Besides, the application and analysis of alignment will facilitate a more competitive and profitable organisation (Galliers, 1991, Luftman and Papp, 1994).

Literature shows a debate on the "capacity" of the model to tackle the role of IT in business performance, and as written by Coltman *et al.* (2007), one single model can probably not explain the relationship between IT, environment, structure, feasibility, managerial beliefs and performance. Nevertheless, other authors have shown an alternative view of alignment by extending the focus beyond strategic planning and strategy fit to include issues such as knowledge sharing among groups of humans (Nelson and Cooprider, 1996), the social dimension of information alignment (Reich and Benbasat, 2000), or the level of use of IT and not just the nature of IT adopted by companies both in supplier and buyer organizations (Fimbel, 2007). In the same vein, Galliers (2004) and Sledgianowski and Lufman (2005) argue that the alignment issue has to be extended and integrated enterprise-wide in a supply chain perspective. In this perspective Luftman (2000) proposes a model of five levels of strategic alignment maturity:

1. Initial/Ad Hoc Process: organizations lack communications between the IT and the business or have a poor communications infrastructure.

2. Committed Process: Organizations have already begun to transform their businesses relationships with IT and are working towards alignment at an initial phase

3. Established Focused Process: senior managers understand the business and also the IT as an emerging component to the organization

4. Improved/Managed Process: IT and business are highly close to each other and organizations produce effective decisions.

5. Optimized Process: Organizations at this level have optimized processes and have developed Integrated and co-adaptive business and IT strategic planning.

Level 5 has to be considered as a SAM best practice, where organization that has an optimally aligned Strategic Alignment Maturity (going through the 4 first

levels), leverage IT assets on an enterprise-wide basis to extend the reach (the IT extrastructure) of the organization into the supply chains of customers and suppliers. Partnerships with external partners become an important issue of strategic alignment.

Nevertheless, this issue highlights key questions that are still unsolved (Avison *et al*., 2004). First, it points out the link between the capacity of companies to align themselves and their level of performance. Secondly it underlines how companies align with one another. Finally it stresses how alignment can be measured. Seeking answers to these questions can lead to a better understanding of the factors and connection modes that companies can set up to operationalize their alignment.

2.2 Information Technology and performance in the Supply Chain

It is now assumed that Information Technology is a key issue in better coordinating enterprises for supply chain performance (Arshinder and Deshmukh, 2008) but despite a large number of publications on IT alignment (for a detailed literature review on SAM, see Chan and Reich, 2007), few authors have examined the impact of alignment in the context of supply chain. This lack of attention to the inter-organizational context can be explained by the fact that alignment is merely "an engineering formal structure process alignment". Thus, it totally ignores business partnerships and the increased need for collaboration in the context of distributed supply sources.

This collaboration between partners has been covered extensively in the strategic management literature (Bowersox, 1990, Hanman, 1997, Laseter, 1998, Gilmour, 1998, Bowersox *et al*., 2000) and especially in the domain of Supply Chain Management. One of the main features is that vertical-process integration from suppliers to customers can be performed through inter-firm strategic alliances. In order to achieve vertical process integration, many enterprises are changing their organisation to break down both intra and inter enterprise barriers and the literature

indicates that integration can support business processes at two different levels (Romano, 2003), intra-company integration and inter-company integration.

McDonald (1991) developed a model in which he examined external impacts of alignment on customers, suppliers and markets. Similarly, Henderson and Venkatraman (1993) have recognized that alignment must be both internal and external to an organization and suggest that organizations must align their business and IT strategies with industry and technology forces. Based on this recommendation, Galliers (2004) also mentions the need to pay attention to alignment with main customers and suppliers all along the supply chain. Rey and Neely (2010) have extended Henderson and Venkatraman's test of co-alignment in the context of inter-organizational relationships. By capturing successful contractual relationships between supplier chain partners, they observe that effective cooperation relies on business partners' need to align their performance measures (Yeung *et al.*, 2006, Kaplan and Norton, 2006). They conclude that alignment of inter-organizational relationship performance measures depends on the fit between the objectives of the contract and the partners.

With the intention of streamlining their supply chain processes and controlling costs, leading retailers around the world are relying more on the use of information technologies, and as noticed by Fosso Wamba *et al.* (2007) the use of automatic identification and data collection is becoming one of the means to support intra and inter organizational business processes and information exchange with their partners.

In recent years, RFID, an emerging supply chain technology classified as a wireless automatic identification and data capture technology, has come to be viewed as an Inter-Organizational Information System (IOIS) (Curtin *et al.*, 2007). But introduction of cross-company IT systems has always been a difficult and time

consuming task (Goebel *et al*., 2009). Among other things, asymmetric costs and benefits, different attitudes to risk and capabilities across supply chain participants can complicate the adoption and efficient use of inter-organizational information systems.

This observation is related to the issue of supply chain alignment while managing a new IT implementation project between organisations. The next paragraph will give more details on RFID as an IOIS.

2.3. New business challenges with RFID

RFID technology is derived from a World War II manufacturing automation technique allowing aircrafts to identify themselves to other friendly aircraft and commanders on the ground. From 1998 to 2003, the Massachusetts Institute of Technology was a leader in retail initiatives, and in 1999 they established the Auto-ID Centre. The Auto-ID Centre at MIT officially closed in late 2003, transferring its intellectual property, including RFID, to Electronic Product Code Global where RFID achieved greater importance than ever before. At present EPC Global standards only cover the deployment of RFID in the supply chain. The technology gained attention when Wal-Mart required its top suppliers to adopt RFID technology, as did the U.S. Department of Defence.

Despite these projects, RFID is still considered as a disruptive IT with a low level of maturity and a lack of standardisation. Companies know little about this technology, how it can be used, and where it can be applied to improve which processes.

RFID offers several advantages for the handling and management of objects in the end-to-end supply chain: an increased visibility of product flows and at the same time a reduced effort for manual object identification and a unique identity of each

product, which opens new possibilities in managing goods throughout their life cycle (Cao et al., 2007). Emerging technologies such as RFID enable lifecycle actors to gather and analyse product lifecycle information, and make efficient decisions without spatial and temporal constraints (Jun et al.,2009). RFID could bring value in various areas such as business process reengineering (Tzeng *et al*., 2008), improving service quality, saving costs (Ferrer *et al*., 2010), enhance visibility and accuracy in the supply chain (Véronneau and Roy, 2009), reduced shrinkage, reduced material handling, increased data accuracy, faster exception management, improved information sharing (Tajima, 2007), improved customer service and logistics resource-management (Sarac *et al.*, 2010). In their paper, Huang et al. (2008) proposed a detailed list of benefits typically reported in the literature. They identified recent trends in RFID-based application, such as smart object, part fabrication, product assembly, JIT, mass customization, maintenance or Product Lifecycle Management.

For these reasons, RFID is seen as a key driver for logistics innovation. It can add value along the entire supply-chain and related logistical operations and business relationships for more effective business process design. It provides a means of tracking supplier items from the supplier, through the distribution network, to the point of consumption. Angeles (2005) explain that the role of RFID in the retail supply chain is to streamline inventory management by providing highly detailed views of product shipments and inventory including information like data on product location, product characteristics, and product inventory levels. The four main processes of supply chain that can be directly concerned with or affected by RFID are (Fosso Wamba *et al*., 2007): put away and replenishment, order filling, shipping, and product and asset tracking.

If technical issues are beginning to be solved, business issues such as business value, inter-organisational relationships, and business knowledge development emerge as particularly salient. The supply-chain possibilities presented by RFID can be considered as transformational (Niederman *et al.*, 2007). Environment scanning is a key step (Avila *et al*., 2009) in helping companies identify the processes where RFID can create more value. This constitutes an important external signal for the SAM model that can lead enterprises to redefine their strategy and restructure their organisations.

The major benefits of RFID implementation will come from solutions across the whole supply chain. From an inter-organisational point of view, taking into account all the partners is difficult because there are many disputes regarding sharing costs and benefits among the manufacturers, logistics providers, distributors and retailers (Visich *et al*., 2007). Despite these difficulties, IT strategy, business infrastructure and IT infrastructure need to be coordinated to better realize the benefits from IT investments. This is the essence of the strategic alignment concept (Hua, 2007).

The long-term impact of RFID may go well beyond simply improving supply chain efficiency. Krotov and Junglas (2008) reported some examples of RFID applications that rely on wireless, automatic identification, but are not merely concerned with identification. At the core of these applications is the idea that objects (advertisement displays or exhibition stands) can seamlessly interact with humans, creating new types of customer services.

The impact of RFID on business strategy should not be underestimated. It could lead to unexpected new service development and business innovation. Implementing RFID can be seen by companies as a new way of doing old things. One

of the objectives of this paper is to highlight in a case study how this project was not only an ICT issue. The impact on the business strategy and on the processes of the members of the supply chain has to be forecasted and analysed to understand the alignment process, inside the retailer organisation but also within the supply chain.

3. Case study description and methodology

The need for empirical analysis in the context of alignment research has been outlined by Chan and Reich (2007), who observed that "research on strategic alignment is too mechanistic and fails to capture real life". This was perhaps the inspiration for the recent upsurge in empirical research on strategic alignment. The majority of these studies have focused on quantitative methodologies and very little focus on describing the complexity of RFID implementation projects in a supply chain as did those studies developed by Loebbecke (2007, 2008). We conducted a single-case study to attain in-depth insight and understanding into this contemporary phenomenon (Yin 2003). Our case study method addresses strategic and operational aspects. This section will present the methodology adopted in conducting the case study.

3.1. Methodology overview

Our case study was performed with a major French retailer that we will call MSR (middle-sized retailer). The choice of this particular case is largely explained by the fact that:

The retailing sector is a pioneer in the implementation of RFID technology. Previous research has been conducted in this sector in other countries (in Germany with Kaufhof and the USA with Wal-Mart), but no research has been done in France. The chosen company is an early adopter in terms of RFID technology projects. The jewellery supply chain with RFID has never been studied before.

Finally, the project under study successfully passed the pilot phases and was implemented in more than 80 jewellery stores

Data was collected at different supply chain levels including the corporate level, retailing centres, Logistic Service Providers, and from other partners. Qualitative data was gathered by using interviewing techniques. We conducted 5 semi-structured interviews with major actors involved in the project.

3.2 Case study description

3.2.1. The company

Founded in 1898, the MSR is a leading food retailer, active in more than 10 000 stores in multiple retail formats (hypermarkets, supermarkets, urban markets, and discount markets). Its operating performance, which has grown steadily over the past several years, now exceeds the industry average with revenues of nearly 25 KE in 2007. This is the result of the Group's unique position in the market and its ability to anticipate changing lifestyles and consumer practices. The company offers a different approach to retailing, one tailored to meet each consumer's specific expectations. Moreover, the company sought to be responsible not only with its customers, but also with its social and economic stakeholders. In order to meet these values, the MSR is forward thinking and innovative in several domains (for example, the company's urban network uses a river transportation system). The RFID technology project is a new challenge that the company has to deal with. It was launched in 2006 with the objective of improving sales productivity in the stores and the reliability of the supply processes.

3.2.2. Actors involved in the RFID project

Not all the actors of the MSR jewellery supply chain are involved in the RFID project. The participants include:

- Suppliers of jewellery: more than 60 worldwide jewellery suppliers deal with the MSR which then distributes the products.

- Group MSR: there are 4 different headquarters-based departments involved in the retailer's project: 1) the IT Department (called IDT), 2) Purchasing, 3) Supply Chain, and 4) the Textile Business Unit that is responsible for both textile and jewellery products.
- The stores of the MSR: In 2009 the company operated 80 stores mainly in France. They are physically located inside the MSR hypermarkets in France. They sell jewellery like watches, rings, earrings, and bangles directly to final customers, like traditional jewellery stores. The sales policies of these stores are completely independent from their hosting hypermarkets.
- The LSP warehouse: LSP is a logistic services provider that receives jewellery from suppliers, stores the products, prepares orders, prints RFID tags according to the type of product, and delivers the goods to the stores. Once a year, the MSR and the LSP jointly participate in the warehouse inventory. LSP is in charge of these services both for the MSR and another chain of a jewellery store. To avoid problems between the two retailing companies, LSP has physically divided the warehouse into two separate and distinct areas where the products are handled.
- The printing company: this company is equipped to produce paper labels from paper rolls and to integrate RFID smart chips in the paper rolls. The printing company then cuts up the rolls to make specific paper tags that are affiliated with the individual items of jewellery to describe them (weight, number of carats etc…).
- The smart chip producer: this company develops UHF smart chips for the MSR group to help them manage their supply chain. They also participated in the creation of specific RFID paper tag readers, as these materials did not

initially exist in their offerings. The reader can be considered as the hardware aspect of the RFID project.

3.2.3. Physical processes and information flows.

The LSP warehouse receives products from suppliers each day, and controls them for the MSR Group. Once the products have been controlled, they are tagged by LSP and stored for future delivery. Once a week, the MSR's stores receive shipments from LSP. After delivery, the sales personnel of the stores control the products with the RFID Reader and store or display the products according to the product status (in stock or on order). Currently, there are three main processes in this supply chain that link the jewellery suppliers and the LSP warehouse, and then the LSP warehouse and the "Boutique Or" stores: 1) Daily reception of products from 60 worldwide jewellery suppliers delivering to LSP, 2) Weekly deliveries to each store, from LSP and 3) LSP's annual inventories.

3.2.4. The IT infrastructure.

The IT infrastructure of the MSR jewellery supply chain was specifically developed for the RFID project and is independent from GOLD, the retailer's main ERP system.

There are three main computer IS that support the RFID project:

- ERP GOLD: The MSR Group's main ERP that aims to centralize all key data. At present, it is not integrated with SINEX
- SINEX: This is the IS that was developed for LSP. SINEX deals with both inventories and day to day receipt of jewellery from suppliers. LSP also physically houses the hardware like the tag printers and RFID readers. This material belongs to the MSR.
- In-house software in the MSR's stores: there are composed of different systems that are not integrated one with another. Each IS is dedicated to a

specific task: collection, receipts, inventories, and editing tags when necessary (a paper tag has broken or when prices are changed through promotions).

3.3. Case study analysis

We used Fosso, Wamba *et al.* (2007)'s framework that that we adapted and completed to illustrate our case study on RFID implementation. Fosso Wamba's framework is specifically developed for RFID projects and is composed of a sequence of three main phases that describe RFID project implementation:

- Opportunity seeking,
- Pilot project and validation and
- RFID project deployment.

3.3.1. Phase 1: Opportunity seeking

This initial phase deals with opportunities to implement an RFID project in a specific value chain. It is composed of six steps.

Phase 1: Opportunity seeking
Step 1: Primary motivation (Why?)
Step 2: Analysis of the product value chain (What and why?)
Step 3: Identification of the critical activities (Which?)
Step 4: Mapping of the network of firms supporting the PVC (Who and with whom?)
Step 5: Mapping of intra-organizational processes for the identified opportunities as they are (How specifically within the organization?)
Step 6: Mapping of inter-organizational processes for the identified opportunities as they are (How specifically between the organizations?)

3.3.2. Phase 2: Pilot project and validation

The objective of this second phase is to develop a pilot project to validate the feasibility of the RFID implementation. With respect to the inter-organizational alignment problem, the goal is to identify the business opportunities that could come from this new technology and to propose process and IT reconfiguration to fit with RFID. It has four steps.

Phase 2: Pilot project and validation
Step 7: Evaluation of RFID Network opportunities in the PVC with respect to the product (level of granularity), to the firms involved in the network, and to the specific activities in the PVC
Step 8: Evaluation of potential RFID Network applications including scenario building and process optimization ("As could be") (HOW within and between organizations?)
Step 9: Mapping of intra- and inter-organizational processes integrating RFID technology
Step 10: Validating business and technological processes integrating RFID technology with key respondents. Feasibility analysis and evaluation of the challenges including ERP and middleware integration and process automation

3.3.3. Phase 3: RFID project deployment

The last phase concerns the validation of the pilot project and deployment of the technology over the whole supply chain.

Phase 3: RFID project deployment
Step 11: Proof of concept (POC) with the pilot project: evaluation including ERP and middleware integration and process automation at all supply chain member levels and decision to go for the beta test replicating POC scenarios in real-life
Step 12: Pilot replicating and evaluation of anticipated VS realised benefits and impacts of RFID. Appropriation by the different organisations involved and their staff members

4. Inter-organizational alignment dynamics during the RFID project

The project was launched with the idea of inserting an innovative IT in a supply chain, namely introducing RFID tags in the MSR's SC.

4.1. SAM according to steps 1, 2, 3: a competitive potential perspective

Step 1: The MSR's primary motivation was to seek opportunities presented by RFID technology to improve processes. An external IT vendor proposed running a preliminary study on RFID implementation (Step 1) for the MSR Information Technology Department (ITD).

Step 2: A manager at the MSR, based in the ITD department, became interested in developing the idea and ultimately took on responsibility for the project. He pushed the idea to the MSR's corporate department that officially agreed to start the RFID project in January 2007.

Step 3: The MSR decided to first experiment with RFID technology implementation on their jewellery activities which are under the textile business unit. Choice of this Product Value Chain (PVC) was motivated because the jewellery activity has its own value chain that is fully independent from the food supply chain (from suppliers to points of sale). In terms of information systems, this jewellery supply chain is also independent from the group's main ERP with no direct integration. Additionally, this independence is reinforced by the fact that the MSR works with an external logistic services provider (LSP) for jewellery products. They decided to use RFID for the logistics activities of the value chain.

Next table give a summary of the mapping between the first step of the project and the strategic alignment model.

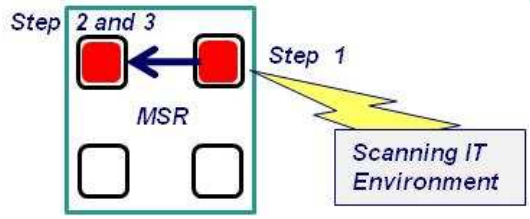
	Fosso Wamba et al. (2007)	SAM (Henderson and Venkatraman, 1993).
	Step 1 : Primary motivation Step2 : Product value chain Step 3 : Critical activities	Scanning IT environment Business Strategy decision Analyses of business impact

Table 3: Mapping the first steps of Alignment in the RFID project.

4.2. SAM according to steps 4, 5, 6

Step 4: The project involved different partners in the Supply Chain: the MSR's headquarters, its 80 points of sale (stores of the MSR), and a single logistic services provider (LSP). The PSR designated one specific store for a pilot project and contacted the corporate division of LSP to ask them to collaborate in the RFID project for the jewellery supply chain they were in charge of. Identification of the activities and mapping of intra and inter organisation infrastructure concerns was done using the SAM.

Step 5: Six business processes were identified by the MSR for the Product Value Chain under examination: 1) purchasing, 2) replenishment at the point of sale, 3) demand management (Warehouse replenishment), 4) IT integration, 5) selling, and 6) invoicing. These business processes could either take place at the headquarters, or at the store. The activities involved in the value chain for both partners are: reception of the jewellery at the warehouse, picking at the warehouse, inventories at the warehouse, reception of jewellery at the point of sale, inventorying jewellery at the point of sale.

Step 6: Inter organisational process concerns:

- **Delivery** (from suppliers to the warehouse): the LSP warehouse regularly sends orders to jewellery suppliers that are located worldwide. Suppliers then deliver the orders to LSP's warehouse.
- **Ordering** (from point of sale to the warehouse): Depending on their sales, each MSR's shop individually and independently sends its order to LSP's warehouse via the group's ERP.
- **Delivery** (from the warehouse to the point of sale): LSP prepares the requested jewellery and sends it to the shops based on the order received from each MSR's shop.

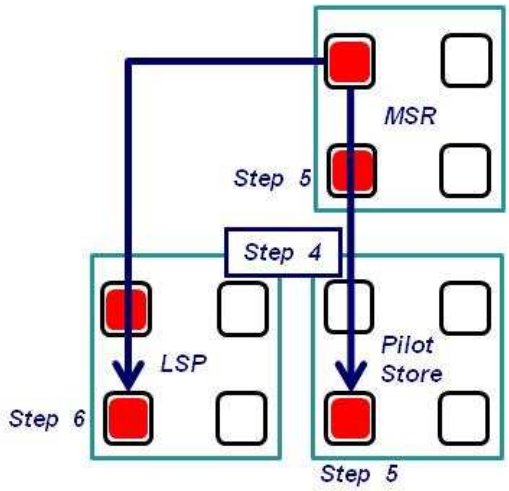
	Fosso Wamba et al. (2007)	SAM (Henderson and Venkatraman, 1993).
	Step 4: Mapping of the network	Inter organizational impact of IT implementation
	Step 5: Mapping of intra organizational processes	Identification of the processes that will need to fit with the new IT within the organization
	Step 5: Mapping of inter organizational processes	Identification of the processes that will need to fit with the new IT between the organizations

Table 4: Mapping of AS IS processes and activities in the actual supply chain

4.3. SAM according to steps 7, 8, 9, 10

Service innovation through disruptive technology calls for multidisciplinary skills and therefore cannot be achieved through a single R&D department. Competencies must be gathered from different actors to reach the goal. Moreover, a jewellery product flow is characterised by small products that are handled manually, low level of demand, high value unit, with items made with metal components (gold, silver etc.) that are not always readable using RFID tags.

Steps 7 and 8: The MSR's IT Strategy Department started to explore the environment to find potential partners that could participate in the project of adapting the needed IS and developing the RFID technology. An initial RFID application scenario was proposed. The objective was to define the possible ways of using RFID, within and between organisations. For the MSR and its partners, the following challenges and applications were identified:

- Producing new labels with RFID Tags

- Tag editing: Labelling the products with RFID tags at the warehouse and at the points of sale
- Tag reading: Using RFID for the reception of products at the points of sale and for inventory control

The next step consisted of defining the "B2B" Intra and Inter organizational processes integrating the new RFID technology. This network not only concerned the MSR and LSP, but also integrated new actors with knowledge and competencies to produce the RFID technology. LSP agreed to collaborate on the project and then aligned its operational processes to fit MSR's requirements (receiving, warehousing, order picking and delivery) and its IT infrastructure (investing in a smart RFID printer, RFID readers, adapting their ERP System and developing interfaces with the MSR's IS) (**steps 9-10**).

The MSR negotiated with the label producer and requested they adapt the size/format of their labels according to the type of jewellery and to include the RFID tag. As the label producer was not equipped to insert the chips in the labels, The MSR asked the Tag producer to accomplish this task. This alignment concerns the strategic domain of 3 companies, the Software Service Provider (SSP), the Label producer and the Tag producer who all agreed to develop new products for the project.

The last step of this phase consisted of validating all the business processes, applications and technological developments that were required for the RFID Project. From the RFID technology side, this step included development of specific RFID readers adapted to very small products, such as jewellery, that were labelled with RFID tags.

From the Information System side, software modifications integrating RFID applications into legacy systems were required, including wireless middleware to

compare the original order to those items received, specific software to write the RFID tags and to print the labels.

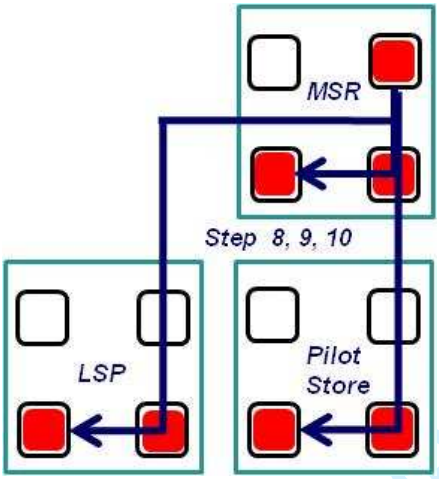
	Fosso Wamba et al. (2007)	SAM (Henderson and Venkatraman, 1993).
	Step 7 : Network opportunities Step 8 : RFID application, scenario building and process optimization Step 9: Mapping of the processes Step 10: Validation of business and technological processes integrating RFID	No match with SAM, just finding partners who can collaborate on the project Adaptation of IT infrastructure and reengineering of the business processes (organization) to fit with IT strategy.

Table 5: Inter organisational Alignment within all B2B partners.

4.4. SAM according to steps 11 and 12

In January 2008 the MSR's pilot project was launched in a single point of sale testing different kinds of tags. The process under scrutiny was automated receipt of orders at this point of sale. For the Logistics Service Provider, the pilot process consisted of re-labelling all products delivered to this specific point of sale after product picking was performed at the warehouse. The objectives of steps 11 and 12 were to validate the development and modifications performed during the pilot project and then propose the final B2B organisation.

For the MSR, this step included updating software and designing a new RFID reader better adapted to the project.

For the Logistics Service Provider, these steps included reengineering the business sourcing process by attaching the product tag upon receipt of the product, instead of at the moment of product delivery (as in the pilot project). It also included

development of an integrated software able to create the tag directly from the MSR's IS.

The final step in the implementation process was deployment of the solution to all MSR's stores. In April 2009 the MSR deployed the solution to the 80 points of sale, thus implementing the RFID technology and its relevant software, and training the individuals who would be using the system.

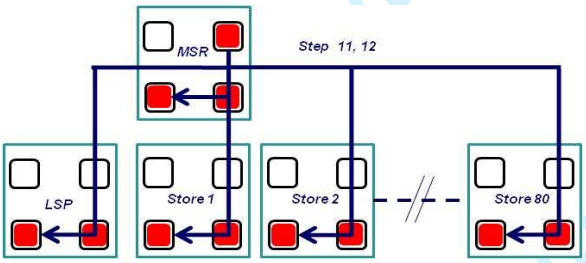
	Fosso Wamba et al. (2007)	SAM (Henderson and Venkatraman, 1993).
	Step 11: Evaluation including ERP and middleware integration and process automation at all supply chain member levels Step 12: Pilot replicating and appropriation by the different organisations involved and their staff members	Adaptation of IT infrastructure and technology to fit with IT strategy Reengineering of the business processes and change management for all the members of the supply chain impacted by the project

Table 6: Step 11 and 12, RFID project deployment.

RFID implementation resulted in performance improvements in the SC main logistic activities including:

- Increased productivity at the point of sale thanks to time savings and reduced human error during reception and inventory control
- Improved warehouse inventory control
- Greater jewellery traceability along the entire supply chain

4.5. Inter-organizational alignment sequences during project phases

As indicated in Table 3, IT strategy acts as an enabler of the project. In this case study, the MSR's IT Manager explored how IT could enable new or enhanced business strategies with corresponding organizational implications (Henderson and Venkatraman, 1993). The challenge in this particular project was identifying the appropriate Value Chain upon which to initially test implementation of this technological innovation. This paragraph will highlight different perspectives of alignment (Henderson, Venkatraman, 1993) according to the different phases (Fosso Wamba et al., 2007) of the project.

Accordingly to the phase 1 in Fosso Wamba et al (2007), the IT manager identified and interpreted the IT environment trends to assist the business managers in understanding the potential opportunities and threats from an IT perspective. We identified the role of the IT manager as being a catalyst and IT Strategy as the anchor Domain. Then Business strategy Domain made an evaluation of the potential application of implementing RFID. As they perceived RFID as a disruptive innovation, not yet used in the company, they made an evaluation of possible opportunities and threats to minimize risk. They decided on which value chain to experiment the project, Jewellery, and to limit for instance the RFID use to logistics activities. Business Strategy is the pivot domain.

Once the value chain was chosen, those processes involved in its logistics activities were identified for modification. Organization infrastructure is therefore the impact domain. This is perspective called "**Competitive Potential**" in Henderson and Venkatraman's proposal (see column 1 on Table 7).

As the logistics activities were chosen for RFID implementation, MSR need the cooperation of other organization involved in the Jewellery Supply Chain: Logistic services provider (LSP), an external supplier in the value chain, and Stores.

In step 4 of the project, the MSR's IT manager, in charge of the project, asked the LSP's top management to be a partner in the RFID project. Once again, the LSP's Business Strategy made an evaluation of the impact of the project on its strategy and business unit and decided to accept, but to limit the RFID experiment to the MSR's Chain and not to implement it on other supply chain. The impact on the LSP's Organisation was then analysed.

This Second alignment sequence concerned both the MSR and the LSP. The anchor domain is the MSR's IT strategy, the pivot domain is the LSP business strategy, and the LSP organisation infrastructure is the impacted domain (see column 2 on Table 7). This is an **inter-organizational competitive potential alignment** perspective.

Next sequence, third one, appears during phase 2: pilot project and validation (Fosso Wamba et al., 2007). To have an entire Supply Chain for this phase, the MSR's IT strategy had to find a Pilot Store that would agree to participate and modify its organisation to fill the requirements of the RFID technology. This is a **multisite competitive potential alignment** perspective (see column 3 on Table 7).

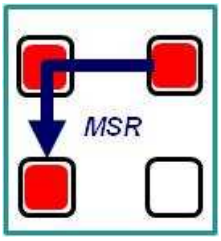
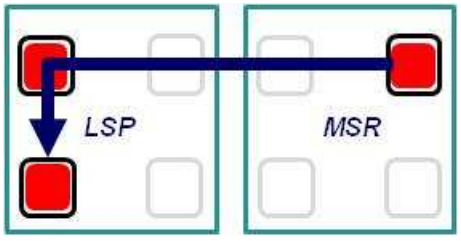
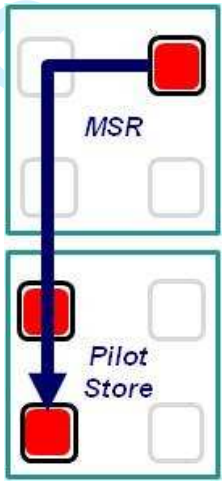
 A Competitive potential perspective (CPP)	 An Inter organizational CPP	 A Multisite CPP

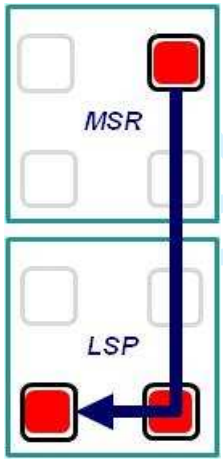
Table 7: RFID pilot project and supply chain Business Process alignment

The RFID technology has been identified by IT strategy as a driver to examine the changes needed in the underlying Information System and its technology. As described earlier by Henderson and Venkatraman (1993), the role of the IT Strategy Manager was then to determine the best allocation of scarce resources both within the organization and in the IT marketplace (label development, tag creation, readers and printers, IS, etc.). The IT Strategy department looked in the environment for some skills and competencies on RFID technology: specific labels suitable for the Jewelry supply chain, very small RFID tag development, IT/IS integration, printers, RFID writers and readers.

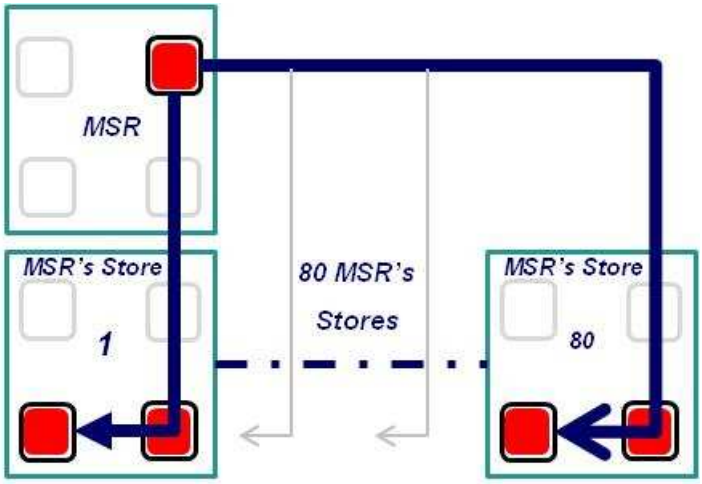
Furthermore, as described in the previous section, there were gaps in the business processes that needed to be closed to enable and exploit the improved technology infrastructure identified at different levels of the supply chain. This included the MSR in terms of replenishment, its Stores for reception and inventory control, and the Logistic Service Provider for product reception and labeling. When the different partners involved in the project agreed on the IT project development, the potential changes on processes at the LSP and within the 80 MSR's stores were examined. This was not a linear process because RID technology is not mature. For different reasons due to the technology development, the tags and labels were modified, and consequently the organisation and processes were changed. This fourth sequence of alignment is a **Service Level Perspective in an inter organizational context.**

It was initiated with the pilot project and deployed within the 80 MSR's jewellery stores and also concerned the Logistic Service Provider. As previously noted, in this project, the main driver of process and IS alignment at LSP was the IT department from Casino (Column1 Table 8). This is chiefly due to the competency of

the MSR's IT department to manage the project, even at its supplier location. This is equally true of the MSR's stores (Column 2 Table 8) that lack an IT department and rely directly upon the MSR for IT strategy.



An inter organisational Service Level Perspective



A Multisite Service Level Perspective

Table 8: RFID project deployment and supply chain Business IT and Business Process alignment

As shown in Table 7 and Table 8 this alignment process combines two perspectives that have one anchor, the IT Strategy domain, and two pivot domains: business strategy and IT infrastructure. This combination was described by Papp (1995) as **Organisation infrastructure fusion**.

The first pivot that was handled was the business strategy. This is not because the business strategy domain was the weakest one, as suggested by Coleman and Papp (2006), but rather because RFID is a disruptive innovation. In this project, even if the short term impact on the business of each project partner was low, a strategic business agreement was needed to launch this first RFID project because of potentially high long term impact. Initially the eventual business strategy changes resulting from use of RFID were not identified. Nevertheless, the choice was made pursue the project involving logistics activities.

For future applications, once RFID competency and skills are acquired and the IT infrastructure is established, further projects could take on more business strategy oriented goals.

For the other players, namely the software provider and the tag printing company, the RFID and IT marketplace project led to product innovation via the creation of new integrated software (SSP), new labels and new RFID tags.

5. Conclusion

Gunasekaran *et al.* (2004) have suggested that "the alignment between information models and supply chain models or objectives needs further investigation". These new research challenges call for:

- identification of critical IT success factors for an integrated and aligned supply chain
- attaining alignment between IT and business models in the supply chain context
- an empirical test of the SAM in the context of inter-organizational relationships.

To address these challenges, we conducted research using a jewellery supply chain in an inter-organizational context. This case study provides answers to the dynamics of alignment in a jewellery supply chain and underlines the main difficulties observed during a pilot project and implementation phases. It also highlights evolving benefits sought by the retailer and its suppliers.

The main conclusions to be drawn from this study are:

- There is not a single strategic alignment but a combination of intra and inter organizational strategic alignments between the two supply chain partners (MSR and LSP). Following Papp (2004), the nature of alignment sequences

are larger than those highlighted by Henderson and Venkatraman (1993). Our case showed two main alignment sequences: the Competitive Potential in phase 1 of the project followed by the Service Level in phase 3. The phase 2 of the project split the Competitive Potential within two sub alignment sequences: a multisite competitive potential alignment perspective and an inter-organizational competitive potential alignment. These combinations of alignments correspond to the Organisation infrastructure fusion (Papp, 1995).

- The alignments are incremental and are the result of interactions between different types of alignment in the supply chain. Each intra organizational alignment impacts the other intra organizational alignments of the partners in the same supply chain. The quality of "local" alignment (intra organizational alignments, which can be multisite) impacts the global supply chain (inter organizational alignments).
- The value identified at the beginning of the project by the IT Strategy department was used as an incentive to change logistic business processes on a single value chain (jewellery product). This explains the initial alignment sequence form: Competitive Potential.
- Additional value has been created and exploited by the different actors of the RFID project even if apparently no companies have created and sustained competitive advantage (Tajima, 2007). The success of the RFID project will lead the MSR to develop a new project with this technology in another product value chain. For the MSR's stores, reception and inventory have become quicker and leave more time for selling. Finally, several product innovations have been developed by the software provider and the tag printing company who are able to propose new products for new markets.

- Ultimately, the impact of the RFID project on the MSR's global strategy was very limited because the MSR's Strategy Department decided to restrict the project to the logistics activities of a single Value Chain. Other opportunities for RFID, such as marketing innovation or adding new customer services were not pursued in the initial application of this disruptive innovation. During the deployment phase, IT Strategy led the project but could not exploit all the potential of the RFID technology to improve sales activities.
- Impact on the logistics business process and organisation of the LSP was also analysed. The LSP has other clients in addition to the MSR, and as such, evaluation of the impact of RFID technology implementation on its other business units was explored. The possibility for the LSP to deploy this technology to other customers and to develop new business from this emerging competitive advantage was considered, but not chosen by LSP's strategy department.

This research introduces several questions. First, this case questions the impact of the different sequences of alignment during the pilot phase on the deployment phase of a project. Second, the context of the relationships between the different companies can change the sequences of alignments: here the MSR imposes the project to the LSP without an initial discussion on long-term strategic potential of RFID in their own business models (Gunasekaran et al., 2004). Third, Papp (2004) invites to consider the future interactions to facilitate long-range planning and strategy formulation. How can the different alignment sequences help us to imagine the future evolutions of this project in order to fully benefit from RFID technology?

Our research shows certain limits concerning methodology. We focus on a single case study and our findings are contextual and cannot be generalized.

Moreover, this RFID project was complex due to its emerging nature and included many different actors from different companies or services, leading to multiple goals and objectives.

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List of Figures and Tables

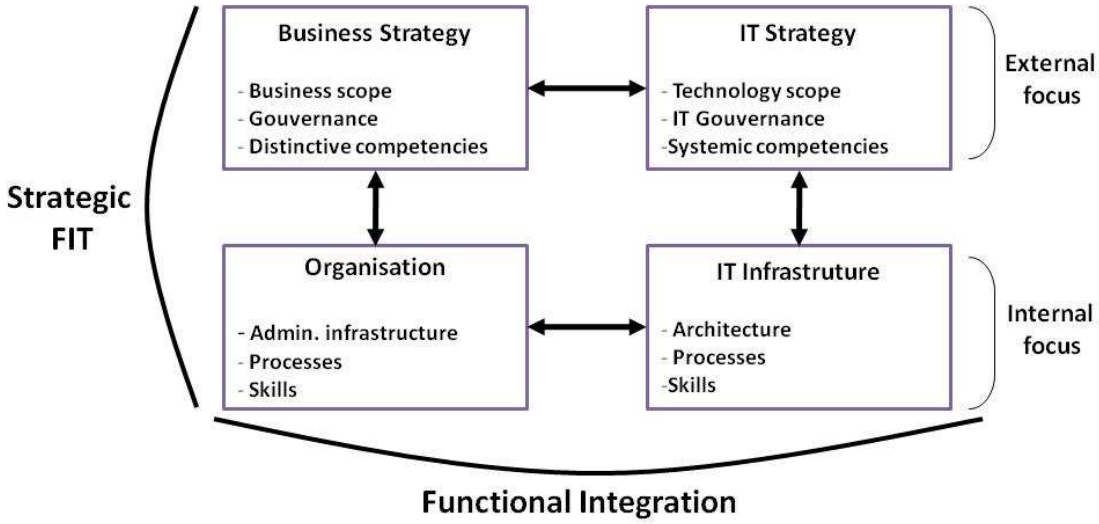


Figure 1: Strategic Alignment Model

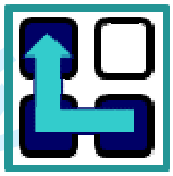
Strategy Execution: this perspective considers the business strategy as the driver of both organization design choices and the logic of the IT infrastructure. The anchor domain is business strategy. The pivot domain is the business infrastructure that needs to be changed. The resulting domain of impact is the information technology infrastructure.	
Technology Potential: this perspective is also driven by business strategy but the pivot is information technology strategy. The information technology infrastructure is thus the domain of impact.	
Competitive Potential: the anchor is information technology strategy and the pivot is business strategy, while organization infrastructure is the impacted domain. This perspective focuses on how emerging information technologies can influence and enable new business strategies.	
Service Level: in this perspective the anchor is information technology strategy, the pivot information technology infrastructure, and the area of impact is organizational infrastructure. The focus of this perspective is the manner in which information technology can improve how products and services are delivered.	
Organization IT Infrastructure: this perspective results in process improvements from information technology and the application of value to the business processes The anchor is organization infrastructure, the pivot is information technology infrastructure, and the impacted domain is information technology strategy.	
IT Infrastructure Strategy: the focus of this perspective is the improvement of information technology strategy based on the implementation of emerging and existing information technology infrastructures. The anchor is information technology infrastructure, which drives the pivot, information technology strategy, and thus impacting business strategy	
IT Organization Infrastructure: the anchor of the seventh perspective is also IT infrastructure, with the pivot being organizational infrastructure and the impact area being business strategy. Although similar to IT infrastructure strategy, IT in this perspective is the driving force and architect by which the visions and processes are carried out	
Organization infrastructure strategy: this final individual perspective exploits the capabilities to enhance new products and services, influence strategy, and develop new relationships. Business infrastructure is the anchor, and this perspective enables enhancement to business strategy (the pivot) thus changing the IT strategy (affected area).,	

Table 1: Alignment perspectives (from Papp, 1995)

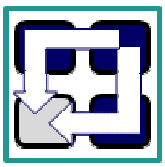
Organization Strategy Fusion Combination of IT Infrastructure Strategy Perspective and IT Organizational Infrastructure Perspective	
Organization Infrastructure Fusion Combination of Competitive Potential Perspective and Service Level Perspective	
IT Strategy Fusion Combination of Organizational Infrastructure Strategy Perspective and Organizational IT Infrastructure Perspective	
IT Infrastructure Fusion Combination of Strategy Execution Perspective and Technology Potential Perspective	

Table 2: Fusion perspectives (from Papp, 1995)

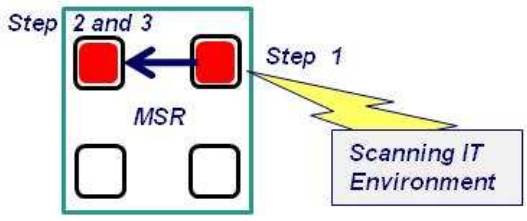
	Fosso Wamba et al. (2007)	SAM (Henderson and Venkatraman, 1993).
	Step 1 : Primary motivation Step2 : Product value chain Step 3 : Critical activities	Scanning IT environment Business Strategy decision Analyses of business impact

Table 3: Mapping the first steps of Alignment in the RFID project.

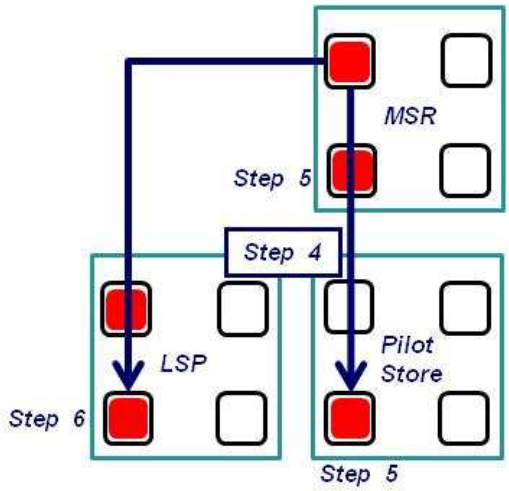
	Fosso Wamba et al. (2007)	SAM (Henderson and Venkatraman, 1993).
	Step 4: Mapping of the network Step 5: Mapping of intra organizational processes Step 5: Mapping of inter organizational processes	Inter organizational impact of IT implementation Identification of the processes that will need to fit with the new IT within the organization Identification of the processes that will need to fit with the new IT between the organizations

Table4: Mapping of AS IS processes and activities in the actual supply chain

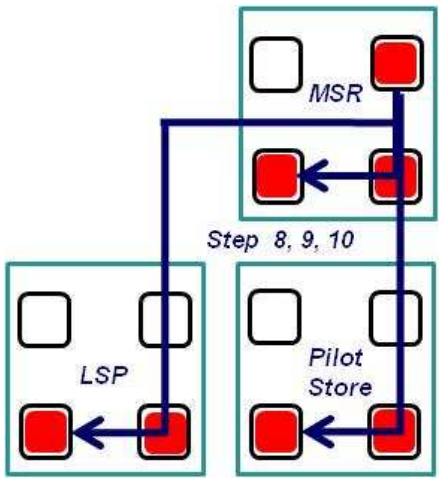
	Fosso Wamba et al. (2007)	SAM (Henderson and Venkatraman, 1993).
	Step 7 : Network opportunities Step 8 : RFID application, scenario building and process optimization Step 9: Mapping of the processes Step 10: Validation of business and technological processes integrating RFID	No match with SAM, just finding partners who can collaborate on the project Adaptation of IT infrastructure and reengineering of the business processes (organization) to fit with IT strategy.

Table5: Inter organisational Alignment within all B2B partners.

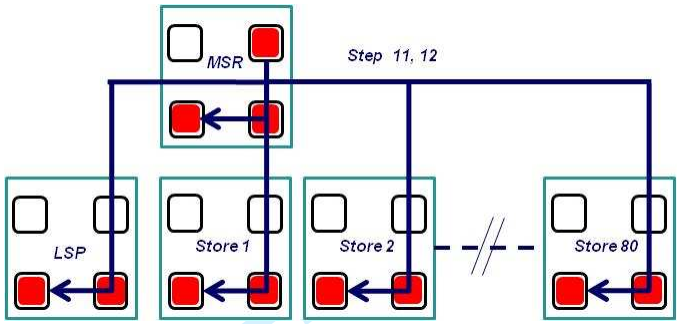
	Fosso Wamba et al. (2007)	SAM (Henderson and Venkatraman, 1993).
	Step 11: Evaluation including ERP and middleware integration and process automation at all supply chain member levels	Adaptation of IT infrastructure and technology to fit with IT strategy
	Step 12: Pilot replicating and appropriation by the different organisations involved and their staff members	Reengineering of the business processes and change management for all the members of the supply chain impacted by the project

Table6: Step 11 and 12, RFID project deployment.

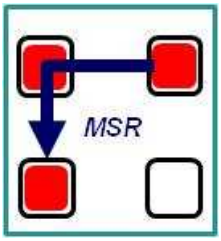
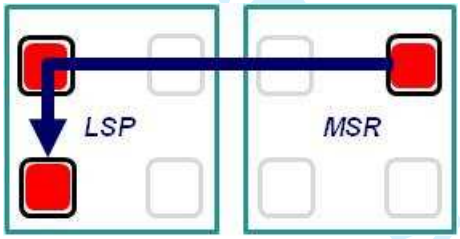
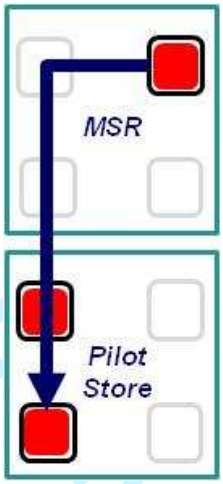
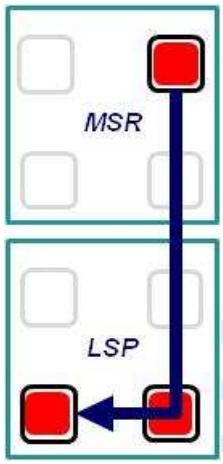
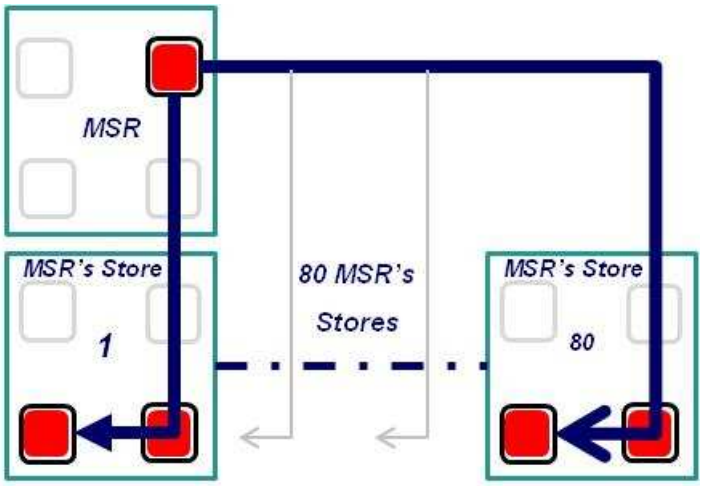
		
A Competitive potential perspective (CPP)	An Inter organizational CPP	A Multisite CPP

Table7: RFID pilot project and supply chain Business Process alignment



An inter organisational Service Level Perspective



A Multisite Service Level Perspective

Table 8: RFID project deployment and supply chain Business IT and Business Process alignment